WHAT IS CLAIMED IS:

1. A noninvasive continuous blood pressure measuring apparatus comprising:

oscillating means for generating an oscillation signal having a desired frequency and a desired amplitude;

a substrate;

a plurality of exciters arranged on said substrate in a direction responsive to said oscillation signal for inducing exciter waveforms in an artery and a blood in said artery of a living body;

a plurality of sensors respectively arranged on said substrate in said direction a predetermined interval apart from said exciters for receiving induced exciter waveforms transmitted through said artery from said living body and outputting detection signals;

switching means for effecting recurrently switching and time-divisionally outputting outputs of said sensors;

determining and selecting means responsive to said switching means for determining one of said outputs in accordance with an output of said switching means and a predetermined judging condition and for selecting and outputting said one of said outputs;

calibration hemadynamometer means for detecting absolute values of a maximum blood pressure and a minimum

blood pressure of said living body;

calculating means for receiving said absolute values from said hemadynamometer means and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said one of said outputs from said determining and selecting means and said absolute values; and

displaying means for displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted by said calculation means.

2. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 1, wherein said substrate correspondingly arranges said exciters and said sensors such that each pair of each of said exciters and each of said sensors is arranged in said direction and said exciter and said sensor of each pair are arranged in a second direction perpendicular to said direction; and

attaching means for attaching said substrate to said living body.

3. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 1, further comprising:

a substrate correspondingly arranging said exciter and said sensors such that each pair including two of said

sensors and one of said exciters arranged between said two of said sensors with said predetermined distance is arranged in said direction; and

attaching means for attaching said substrate to said living body.

4. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 1, further comprising:

a plurality of a/d converters for respectively a/d-converting said detection signals and supplying converted signals to said determining and selecting means as said outputs of said sensors.

5. A noninvasive continuous blood pressure measuring apparatus comprising:

oscillating means for generating an oscillation signal having a desired frequency and a desired amplitude;

an exciter arranged responsive to said oscillation signal for inducing an exciter waveform in an artery and [a] blood in said artery of a living body;

a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

calibration hemadynamometer means for detecting

absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

calculating means for receiving absolute values from said calibration hemadynamometer means and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal and said absolute values; and

displaying means for displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted by said calculation means~~.~~;

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6. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 5, wherein said oscillation means further comprises:

clock signal generation means for generating a clock signal;

a processor responsive to frequency control data and said clock signal for successively generating frequency signal data indicative of amplitude in time base in accordance with said frequency control data;

a d/a converter for converting said frequency signal data; and

filter means for low-pass filtering an output of said d/a converter and outputting said oscillation signal of which frequency is controlled in accordance with said

frequency data.

7. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 5, wherein said oscillation means comprises:

clock signal generation means for generating a clock signal;

a numerically-controlled oscillator responsive to frequency control data and said clock signal for successively generating frequency signal data indicative of amplitude in time base in accordance with said frequency control data;

a d/a converter for converting said frequency signal data; and

filter means for low-pass filtering an output of said d/a converter and outputting said oscillation signal of which frequency is controlled in accordance with said frequency data.

8. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 5, wherein said oscillation means comprises:

clock signal generation means for generating a clock signal;

a processor responsive to frequency control data for

generating one cycle of frequency signal data and storing said one cycle of frequency signal data in a look-up table;

address signal generating means for generating an address signal in response to said clock signal to operate said look-up table to successively read and output the one cycle of frequency data indicative of an amplitude of said oscillation signal;

a d/a converter for converting said one cycle of frequency data; and

filter means for low-pass filtering an output of said a/d converter and outputting said oscillation signal of which frequency is controlled in accordance with said frequency data.

9. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 5, wherein said oscillation means comprises:

a PLL circuit responsive to frequency control data for successively generating a frequency signal; and

filter means for low-pass filtering said frequency signal and outputting the filtered frequency signal as said oscillation signal of which frequency is controlled in accordance with said frequency data.

10. A noninvasive continuous blood pressure measuring

apparatus comprising:

oscillating means for generating an oscillation signal having a desired frequency and a desired amplitude;

an exciter responsive to said oscillation signal for inducing an exciter waveform in an artery and a blood in said artery of a living body;

a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

an a/d converter for a/d-converting said detection signal;

calibration hemadynamometer means for detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

a microprocessor including filter means and calculating means, said filter means band-pass-filtering said detection signal from said a/d converter, said calculating means receiving said absolute values from said calibration hemadynamometer means and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal from said filter means and said absolute values; and

displaying means for displaying a continuous blood

pressure variation from said instantaneous blood pressure successively outputted by said calculation means.

11. A noninvasive continuous blood pressure measuring apparatus comprising:

oscillating means for generating an oscillation signal having a desired frequency and a desired amplitude;

an exciter responsive to said oscillation signal for inducing an exciter waveform in an artery and a blood in said artery of a living body;

a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

calibration hemadynamometer means for detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

bandpass filter means for band-pass-filtering said detection signal from said sensor;

an a/d converter for a/d-converting said detection signal from said bandpass filter means;

a microprocessor including calculating means for receiving said absolute values from said calibration hemadynamometer means and successively calculating and outputting an instantaneous blood pressure value from a

phase relation between said oscillation signal and said detection signal from said a/d converter and said absolute values; and

displaying means for displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted by said calculation means.

12. A noninvasive continuous blood pressure measuring apparatus comprising:

oscillating means for generating an oscillation signal of which frequency is controlled;

an exciter responsive to said oscillation signal for inducing an exciter waveform in an artery and a blood in said artery of a living body;

a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

calibration hemadynamometer means for detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

frequency determining means responsive to said sensor for controlling said oscillating means to successively control said frequency at different frequencies, determining one of said difference frequencies

in accordance with said detection signal outputted at different frequencies, and then, controlling said oscillating means to continuously generating said oscillation signal at said one of said different frequencies;

calculating means responsive to said frequency determining means for receiving absolute values from said calibration hemadynamometer means and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal at said one of said different frequencies and said absolute values; and

displaying means for displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted by said calculation means.

13. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 12, wherein said frequency determining means detects attenuations in said detection signal at different frequencies and determines said one of said difference frequencies in accordance with a minimum of said attenuations.

14. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 12, wherein said frequency

determining means detects dispersions in amplitudes of said detection signal at different frequencies and determines said one of said different frequencies in accordance with a minimum of said dispersions.

15. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 12, wherein said frequency determining means detects phase shifts in said detection signal at different frequencies and determines said one of said difference frequencies in accordance with a maximum of said phase shifts.

16. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 12, wherein said frequency determining means detects attenuations in said detection signal at different frequencies, detects dispersions in amplitudes of said detection signal at said different frequencies, and detects phase shifts in said detection signal at said different frequencies, obtains estimation values at said different frequencies through an estimating function for estimating said attenuations, said dispersions, and said phase shifts, and determines said one of said difference frequencies in accordance with the estimation values at said different frequencies.

17. A noninvasive continuous blood pressure measuring apparatus comprising:

oscillating means for generating an oscillation signal of which waveform is controlled;

an exciter responsive to said oscillation signal for inducing an exciter waveform in an artery and a blood in said artery of a living body;

a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

calibration hemadynamometer means for detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

waveform determining means responsive to said sensor for controlling said oscillation means to control said oscillation signal successively have different waveforms and determining one of said difference waveforms in accordance with said detection signal outputted at different waveforms and then, controlling said oscillating means to continuously generating said oscillation signal at said one of said different waveforms;

calculating means responsive to said frequency determining means for receiving absolute values from said calibration hemadynamometer means and successively

calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal at said one of said different waveforms and said absolute values; and

displaying means for displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted by said calculation means.

18. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 17, wherein said waveform determining means detects attenuations in said detection signal at said different waveforms and determines said one of said difference waveforms in accordance with a minimum of said attenuations.

19. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 17, wherein said waveform determining means detects dispersions in amplitudes of said detection signal at said different waveforms and determines said one of said difference waveforms in accordance with a minimum of said dispersions.

20. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 17, wherein said waveform determining means detects phase shifts in said detection

signal at said different waveforms and determines said one of said difference waveforms in accordance with a maximum of said phase shifts.

21. The noninvasive continuous blood pressure measuring apparatus as claimed in claim 17, wherein said waveform determining means detects attenuations in said detection signal at said different waveforms, detects dispersions in amplitudes of said detection signal at said different waveforms, and detects phase shifts in said detection signal at said different waveforms, obtains estimation values at said different waveforms through an estimating function for estimating said attenuations, said dispersions, and said phase shifts, and determines said one of said difference waveforms in accordance with the estimation values at said different waveforms.

22. A method of noninvasively measuring continuous blood pressure comprising the steps of:

(a) generating an oscillation signal of which frequency is controlled;

(b) providing an exciter responsive to said oscillation signal inducing an exciter waveform in an artery and a blood in said artery of a living body;

(c) providing a sensor arranged a predetermined

interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

(d) detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

(e) controlling said oscillation signal to successively control said frequency at different frequencies;

(f) determining one of said difference frequencies in accordance with said detection signal outputted at different frequencies;

(g) continuously generating said oscillation signal at said one of said different frequencies;

(h) receiving absolute values and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal at said one of said different frequencies and said absolute values; and

(i) displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted.

23. The method as claimed in claim 22, further comprising the step of:

detecting attenuations in said detection signal at

different frequencies, wherein in said step (f), said one of said difference frequencies is determined in accordance with a minimum of said attenuations.

24. The method as claimed in claim 22, further comprising the step of: detecting dispersions in amplitudes of said detection signal at different frequencies, wherein in said step (f) said one of said difference frequencies is determined in accordance with a minimum of said dispersions.

25. The method as claimed in claim 22, further comprising the step of:

detecting phase shifts in said detection signal at different frequencies, wherein in said step (f) said one of said difference frequencies is determined in accordance with a maximum of said phase shifts.

26. The method as claimed in claim 22, further comprising the steps of:

detecting attenuations in said detection signal at different frequencies;

detecting dispersions in amplitudes of said detection signal at said different frequencies;

detecting phase shifts in said detection signal at said different frequencies;

obtaining estimation values at said different frequencies through an estimating function for estimating said attenuations, said dispersions, and said phase shifts; and

determining said one of said difference frequencies in accordance with the estimation values at said different frequencies.

27. A method of noninvasively measuring continuous blood pressure comprising the steps of:

(a) generating an oscillation signal of which waveform is controlled;

(b) providing an exciter responsive to said oscillation signal inducing an exciter waveform in an artery and a blood in said artery of a living body;

(c) providing a sensor arranged a predetermined interval apart from said exciter for receiving said induced exciter waveform transmitted through said artery from said living body and outputting detection signal;

(d) detecting absolute values of a maximum blood pressure and a minimum blood pressure of said living body;

(e) controlling said oscillation signal to successively control said frequency at different waveforms;

(f) determining one of said difference waveforms in accordance with said detection signal outputted at

different waveforms;

(g) continuously generating said oscillation signal at said one of said different waveforms;

(h) receiving absolute values and successively calculating and outputting an instantaneous blood pressure value from a phase relation between said oscillation signal and said detection signal at said one of said different waveforms and said absolute values; and

(i) displaying a continuous blood pressure variation from said instantaneous blood pressure successively outputted.

28. The method as claimed in claim 27, further comprising the step of:

detecting attenuations in said detection signal at said different waveforms, wherein in said step (f), said one of said difference waveforms is determined in accordance with a minimum of said attenuations.

29. The method as claimed in claim 27, further comprising the step of: detecting dispersions in amplitudes of said detection signal at said different waveforms, wherein in said step (f) said one of said difference waveforms is determined in accordance with a minimum of said dispersions.

30. The method as claimed in claim 27, further comprising the step of:

detecting phase shifts in said detection signal at different waveforms, wherein in said step (f) said one of said difference waveforms is determined in accordance with a maximum of said phase shifts.

31. The method as claimed in claim 27, further comprising the steps of:

detecting attenuations in said detection signal at said different waveforms;

detecting dispersions in amplitudes of said detection signal at said different waveforms;

detecting phase shifts in said detection signal at said different waveforms;

obtaining estimation values at said different waveforms through an estimating function for estimating said attenuations, said dispersions, and said phase shifts; and

determining said one of said difference waveforms in accordance with the estimation values at said different waveforms.